

EXHIBIT 5

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

ORACLE AMERICA, INC.

Plaintiff,

v.

GOOGLE, INC.

Defendant.

Case No. 3:10-cv-03561-WHA

**OPENING EXPERT REPORT OF DR. OWEN ASTRACHAN
ON TECHNICAL ISSUES RELATING TO FAIR USE**

**CONTAINS HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY MATERIAL
SUBJECT TO PROTECTIVE ORDER**

The original trial focused on the structure, sequence, and operation (SSO) of these 37 API packages by way of the similar method declarations in the Android Core Libraries. For purposes of this report, I generally treat the SSO and method declarations jointly, and my opinions apply to them equally regardless whether they are considered together or independently.

108. I also understand that Oracle may contend that other Google implementations of Java APIs, method declarations, and/or source code is also infringing, including implementations found in later versions of Android or extensions of the platform into other areas (including wearables, TVs, and cars). Because I have not seen a corresponding expert analysis, I reserve judgment as to whether such alleged uses would be infringing or instead qualify as fair use, and will address that in either or both of my rebuttal and reply reports.

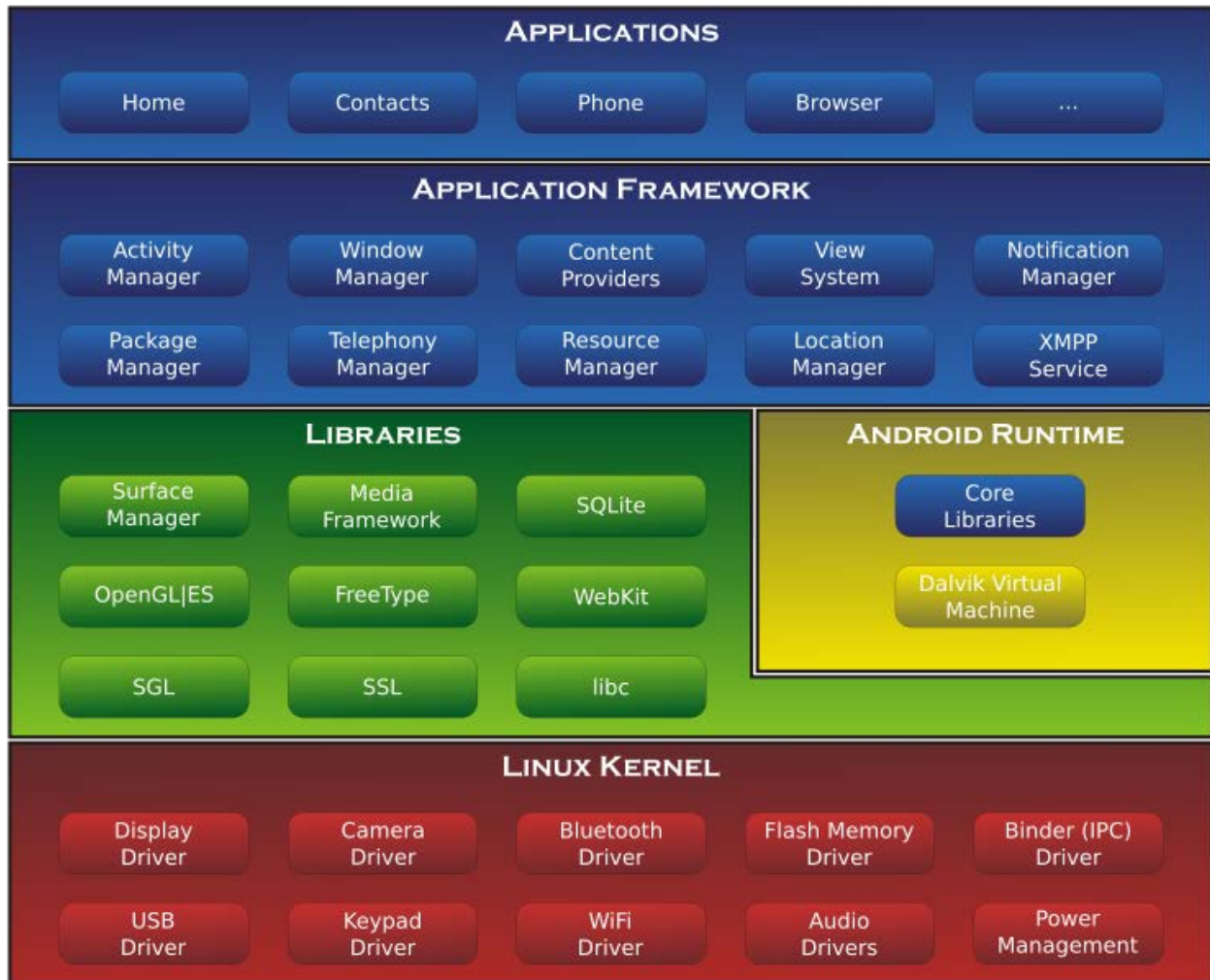
V. ANDROID

A. Android Platform

109. The Android platform is an open and free software stack that includes an operating system, middleware and also key applications for use on mobile devices, including smartphones. This report uses the term Android to encompass all versions of Android published by the Android Open Source Project—basically versions 1.0 through 6.0. *See* <https://source.android.com/source/build-numbers.html> (listing codenames, versions, and build numbers).⁸ That is, my opinions are the same with respect the various different versions.

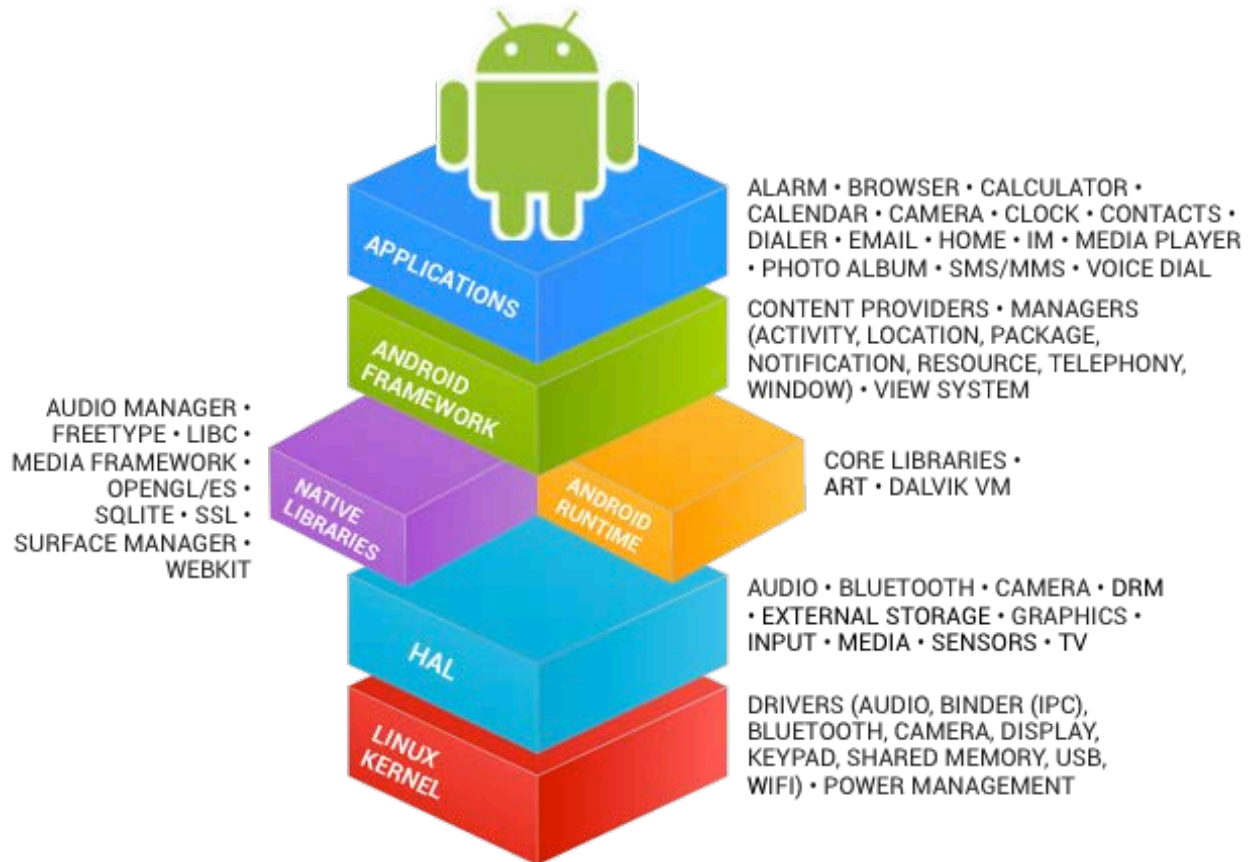
110. The stack is comprised of the layers depicted in the follow graphic, which I will explain in more detail below:

⁸ As noted above, though, this report does not address Android Wear, Android Auto, and Android TV, for which I have not yet seen any infringement analysis.



See Android Anatomy and Physiology (available at <https://sites.google.com/site/io/anatomy--physiology-of-an-android/Android-Anatomy-GoogleIO.pdf?attredirects=0>).

111. Another, more recent graphical representation of the stack is as follows:



The Android Source Code (available at <http://source.android.com/source/index.html>).

1. Linux Kernel

112. At the bottom of the Android software stack sits the Linux Kernel. Android’s Linux Kernel is based on Linux version 2.6. Among other things, the Linux Kernel provides preemptive multitasking⁹ and low-level core system services such as memory, process and power management. By way of a hardware abstraction layer (HAL), the Linux Kernel also provides a network stack and device drivers for hardware such as the device display, Wi-Fi, and audio.

⁹ “Preemptive multitasking” is the ability of an operating system to execute multiple programs so that they appear to be executing simultaneously. The operating system uses criteria and responds to external events to transfer the CPU and other system resources between the programs so quickly that to the user the programs appear to execute simultaneously.

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Executed on the 8th of January, 2016 in Durham, NC.

A handwritten signature in black ink, appearing to be 'O. Astrachan', written over a horizontal line.

Dr. Owen Astrachan